

AMENDMENTS TO THE DRAWINGS

Attached is a new set of drawings where the figures are properly identified as FIG. 1a, FIG. 1b, FIG. 2a, FIG 2b, FIG. 3a, FIG. 3b, FIG. 4a, FIG. 4b, and FIG. 5a and FIG. 5b. Also separate reference numerals are used now for elements shown, respectively in FIG's. 1a and 1b. Further the caption "FIG. 1" has been deleted. These new drawings were prepared along the lines suggested by the Examiner and applicants request that these new drawings be substituted for the original drawings. Applicants' attorney certifies that there is no new matter in the new drawings.

REMARKS

In response to the Examiner's objections to the specification and drawings applicants have amended both the specification and the drawings and attached are a substitute specification (and a marked copy of the original specification) and substitute drawings amended along the lines suggested by the Examiner.

Note also that claims 11, 20 and 21 have been cancelled such that no amendments to the drawings to add features previously claimed but not shown is required.

The term "interference" should have been --undercut--. Apparently the translator chose the wrong word when translating from German to English. In any event, such undercut portions are known in the art. See for example "undercut portion 7" in FIG's. 8 and 9 of the Honda U.S. Patent 4,591,025. To remedy the situation, applicant is amending the specification to make reference to the Honda patent and to change "interference" to --undercut portions--.

In response to the Examiner's rejection of the claims under 35 USC § 112, applicants have amended the claims to remove the indefiniteness in the original claims and have provided clarity and antecedent basis in the amended claims. In particular, note that it was intended to state in claim 1 that the ratio was -- ≤ 40 -- as set forth on page 4 of the specification. Apparently the symbol " \leq " did not print out when the original claims were printed out. This now has been corrected by calling for --less than-- 40 in claim 1.

The Examiner's rejection of claim 1 under 35 U.S.C. § 103(a) for being unpatentable over the Hamaguchi U.S. Patent No. 6,626,266 in view the Heikkinen U.S. Patent No. 4,756,388, as this rejection may be attempted to be applied against the amended claims, is respectfully traversed.

In support of this traverse, it is pointed out that the Hamaguchi patent merely discloses a number of parallel cables wrapped around a drive sheave, but it does not disclose a cable being twice wrapped around the drive sheave.

The Heikknen patent, on the other hand, discloses a cable twice wrapped around a drive sheave 3 including a number of parallel cables 4. However, the cable has to be guided around two deflecting sheaves 7 and 2, whereas in the present application the cable is guided as shown in FIG. 1 and in the corresponding description (from drive sheave 2 to the counter sheave 3, back to

the drive sheave 2, wrapped around the drive sheave 2, back to the counter sheave 3).

A considerable disadvantage of Heikkinen is that there are many cross-overs between cables. Consequently, it is necessary to assemble the elevator carefully. This requires well-trained technicians for the assembly. Furthermore, vibrations in the cables can, just the same, cause contact between the cables at the cross-overs. This may result in damage to the cables and early failures. In contrast, the gearless cable-operated elevator of the present invention does not comprise any cross-overs of cables.

Furthermore, the cables according to the present invention have nearly twice the life-time of conventional cables. The number of diverting sheaves is reduced and thus there is a reduced bending stress for the cables compared to Heikkinen (at sheave 7). The present construction requires less space, less components and causes less effort when assembling the cables.

Please note that the bending direction in Heikkinen at diverting sheave 7 is opposite to the bending direction at sheave 3. According to the European guideline EN 81-1 for elevators, opposite bending directions cause stress and damage four times as much as successive bendings in the same direction. Therefore, the stress for a cable in the construction of Heikkinen is considerably increased.

Regarding the ratio of drive sheave diameter to nominal diameter, the Examiner cites col. 2, lns. 25 -28 of Heikkinen. According to this disclosure, thinner cables and thus thinner drive sheave diameters may be used. However, according to applicant, this statement does not relate to any ratio between the diameters. In fact, the ratio remains the same when using thinner cables and smaller diameters of the drive sheave. Thus the claimed feature is not disclosed.

The feature of steel cables has been introduced because this feature is not explicitly disclosed in any of the cited references (as far as applicant has studied these documents). A skilled person, when using steel cables, would not reduce the ratio between the drive sheave diameter and the diameter of the carrier cable. At least he would rather use synthetic cables.

Only when using the combination of features as claimed in amended claim 1 will a smaller ratio of the diameters be acceptable. However, none of the cited

references discloses or suggests the combination of features set forth in amended claim 1 or renders the subject-matter of amended claim 1 obvious.

The Examiner's rejection of claim 5 under 35 U.S.C. § 103(a) for being unpatentable over the Hamaguchi U.S. Patent No. 6,626,266 in view the Heikkinen U.S. Patent No. 4,756,388, and further in view of the De Angelis et al. U.S. Patent No. 5,566,786, as this rejection may be attempted to be applied against the amended claims, is respectfully traversed.

De Angelis et al. teaches the use of a synthetic fiber cable because, in comparison with steel cables, they permit a substantially larger number of bending change (cf. col. Ins. 59-61).

Applicant can not find where this document discloses any diameter of the cable (De Angelis has been cited with respect to claim 5). However, provided that such a diameter is disclosed, the citation favors another solution than the present invention. According to the present application (cf. amended claim 1) steel cables are be used. Of course steel cables have particular advantages over synthetic cables.

Please note that, particularly when using steel cables, the diameter would have to be selected quite large (resulting in large diameters of the drive sheave). Consequently, a skilled person wishing to reduce the drive sheave diameter would probably (according to De Angelis et al.) select synthetic fiber cables instead of selecting several parallel steel carrier cables wrapped twice around the drive sheave.

Altogether, the solution suggested in the De Angelis citation leads a skilled person away from the solution of the present invention, now set forth even more clearly in amended claim 1.

The Examiner's rejection of claims 6 and 9 under 35 U.S.C. § 103(a) for being unpatentable over the Hamaguchi U.S. Patent No. 6,626,266 in view the Heikkinen U.S. Patent No. 4,756,388, and further in view of the De Angelis et al. U.S. Patent No. 5,566,786 and the Aulanko et al. U.S. Patent No. 5,429,211, as this rejection may be attempted to be applied against the amended claims, is respectfully traversed.

Aulanko et al., teaches a passenger elevator system with a load capacity of 800 kg. The object of the invention disclosed in Aulanko et al. is to improve the elevator machinery.

However, there is no correlation to the technical problem of the present application. According to col. 2, Ins. 16-17, traction sheaves with different diameters may be attached to a particular rotor. However, there is no disclosure to use a small drive sheave diameter on a steel cable. Thus there is no disclosure how to obtain an elevator for high loads (cf. claims 6 and 7 of the present application).

When additionally considering De Angelis et al. , a person skilled in the art would be motivated to use a synthetic cable instead of steel cables when using smaller drive sheave diameters, but a skilled person would not come to the solution of the present application set forth in the amended claims.

Regarding claim 9, it has to be recognized that in Aulanko et al. there is no indication to use several parallel carrier cables. Instead, one cable is wrapped around the drive sheave a few times resulting in larger bending forces for the cable. A variation of the number of carrier cables is not provided for. Furthermore, there is no indication about the diameters used for the traction sheave and the cable, respectively.

The Examiner's rejection of claims 7, 8, 10, and 12-19 under 35 U.S.C. § 103(a) for being unpatentable over the Hamaguchi U.S. Patent No. 6,626,266 in view the Heikkinen U.S. Patent No. 4,756,388, and further in view of the Aulanko et al. U.S. Patent No. 5,429,211, or further in view of the Honda U.S. Patent No. 4,591,025, or further in view of the Hollowell et al. WO 99/43595, or further in view of the Damien U.S. Patent No. 5,651,245, as these rejections may be attempted to be applied against the amended claims, are respectfully traversed.

In support of this traverse, Honda teaches the use of the counter sheave as a distancing deflection sheave (claim 8).

Hollowell et al. discloses various arrangements of an elevator drive sheave (cf. claims 12-14).

As the examiner indicates, Hamaguchi does not disclose steel cables to be used in the elevator (cf. claim 17 as originally filed, now included in claim 1)

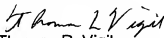
Particular steel cables are disclosed by Damien. However, Damien indicates that there may be problems when winding steel cables over pulleys (cf. col. 1, Ins. 31 -37). For this reason, Damien suggests a particular cable including a core element made from synthetic material, cf. col. 2, Ins. 28-31.

However, this is a different solution in order to increase the lifetime of the cables. In the present invention as set forth in the amended claims, any conventional steel cables may be used. The disadvantage of using steel cables may be compensated by the combination of measure according to claim 1. In other words, Damien teaches to improve the construction of steel cables in order to reduce the wear on the cables, whereas the present invention, as set forth in the amended claims, teaches in a different direction, i.e., reducing the diameter of steel cables, using a plurality of cables wrapped in parallel, each wrapped twice around the drive sheave. Thus, the solution set forth by the present invention in the amended claims is not anticipated or rendered obvious by the combination of the cited references.

In summary, applicant submits that upon entry of the above amendments to the application, the specification and drawings will be clear, the claims will be distinguished over the prior art cited, and the application otherwise will be in condition for allowance. An early and favorable action to that end is requested.

Respectfully submitted,

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